Determination of Seasonal Trends for Carbon, Nitrogen, Pigments, and Sediment Resuspension Rates in Budd Inlet using Moored Sediment Traps

Dale Norton
Washington Department of Ecology

Charles D. Boatman
Aura Nova Consultants, Inc.

Abstract

To evaluate the spatial temporal distribution of organic carbon, nitrogen, and pigments associated with particulates in Budd Inlet, moored sediment traps were deployed 1 m above the bottom at six locations in Budd Inlet from October 1996 to October 1997. High-resolution (biweekly) sampling occurred for carbon, nitrogen, and pigments, producing a data set capable of distinguishing short-term episodic events in the inlet. Short-term sampling of pigments was used to estimate losses of phytoplankton from sinking and grazing. Long-term (bimonthly) sampling was used to determine sediment accumulation rates, biogenic silica concentrations, and Pb-210 and Ra-226 activities. Near-surface traps (biweekly sampling) were deployed to estimate the carbon and nitrogen flux produced by phytoplankton.

Bottom sediment resuspension rates were also determined using three independent methods: comparison of gross and net sedimentation rates, biogenic silica flux mass balance, and mass balance of carbon and nitrogen. The latter techniques required deployment of the surface sediment traps. Excellent agreement was observed between all three methods.

The sediment trap data collected proved to be a critical component of the overall Budd Inlet Study goal to develop a scientific understanding and working model of phytoplankton dynamics and nutrient transport/recycling in the inlet.

Modeling Nutrient Dynamics and Eutrophication Potential in Budd Inlet

Charles D. Boatman
Aura Nova Consultants, Inc.

John E. Edinger
J. E. Edinger Associates, Inc .

Abstract

An integrated 3-D numerical hydrodynamics and water quality model is being developed and applied to Budd Inlet. The objective of the modeling is to assess potential impacts on the water quality in Budd Inlet related to the present and projected additional discharge from the LOTT wastewater treatment facility, which discharges into the head of Budd Inlet. Current population estimates show that the presently permitted treatment plant flows may be exceeded during wet-weather winter months within the next seven years. If Budd Inlet could assimilate greater effluent loads during wet weather without significantly impacting water quality, then LOTT may be able to utilize existing unused treatment plant capacity as part of their overall wastewater management strategy, resulting in potentially significant cost savings to the rate payers.

Chronic low dissolved oxygen conditions that occur in the near-bottom waters within Budd Inlet in the summer and early fall were identified as the water quality condition of most concern and are the focus of the modeling effort. Key questions to be addressed by the modeling include:

- Can the effluent discharge be increased above the present permit limit during wet weather months without adversely impacting water quality?
- Could the present permit condition requiring nitrogen removal during spring, summer and early fall be changed without adversely impacting water quality?
- What is LOTT's contribution to the summertime low dissolved oxygen conditions?

We will present an overview of the modeling approach and the key findings.